VSB – Technical University of Ostrava
Faculty of Electrical Engineering and Computer Science
Department of Physics

Diploma Thesis Assignment

Student: **Ing. Pierre Koleják**

Study Programme: N0533A110006 Applied Physics

Title: Time-domain terahertz ellipsometry and polarimetric applications of spintronic emitters
Terahertzová elipsometrie v časové doméně a polarimetrické aplikace spintronických emitorů

The thesis language: English

Description:

Polarimetric and ellipsometric measurement in terahertz (THz) spectral range enables wide range of applications in the field of terahertz photonics. The main target of the thesis is to propose a procedure to obtain ellipsometric sensitivity in the time-domain terahertz spectrometers, including discussion of the special emitters, polarization components, polarization detection, and calibration of the system. The main attention will be devoted to spintronic emitter, which enables measurement in a wide spectral range and control of polarization states by external magnetic field.
The main goals of the thesis are:
1. Description of principles of ellipsometric measurement using time-domain spectroscopy.
2. Generation of THz waves using emitters based on spintronic effects (inverse spin-Hall and inverse Rashba-Edelstein effects)
3. Experimental testing of polarization states generated using spintronic emitters

References:

1. R. M. A. Azzam, and N. M. Bashara. Ellipsometry and Polarized Light. New York: sole distributors for the USA and Canada, Elsevier North-Holland, (1977),
2. J. J. Gil Pérez and R. Ossikovski, Polarized light and the Mueller matrix approach, Series in Optics and Optoelectronics (CRC Press, 2016),
4. T. Kampfrath et. al., Terahertz spin current pulses controlled by magnetic heterostructures, Nat. Nanotechnol. 8, 256 (2013).
5. T. Seifert et. al., Efficient metallic spintronic emitters of ultrabroadband terahertz radiation, Nat. Photonics 10, 483 (2016).
6. Y.-S. Lee, Principles of Terahertz Science and Technology, Springer, 2009.

Extent and terms of a thesis are specified in directions for its elaboration that are opened to the public on the web sites of the faculty.

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Date of issue: 01.09.2019

Date of submission: 30.04.2020

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